SUBMISSION INSTRUCTIONS NO. 15

EVALUATING THE NATURE & EXTENT OF CONTAMINATION (NES) FOR REGULATED SANITARY, CDD, AND INDUSTRIAL LANDFILLS

Developed by

Virginia Department of Environmental Quality
Office of Waste Permitting
Groundwater
629 East Main Street
Richmond, VA 23219

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1.0 APPLICABILITY OF INSTRUCTIONS

These instructions are applicable to all solid waste facilities conducting groundwater monitoring under the requirements contained in the Virginia Solid Waste Management Regulations (VSWMR), promulgated by the Virginia Waste Management Board, December 21st, 1988, as amended.

2.0 INTENT OF INSTRUCTIONS

If, after statistical analysis, it has been determined that one or more Appendix 5.1 constituents are detected at statistically significant levels above the established groundwater protection standard (GPS), the Permittee shall submit to the Director an Assessment of Corrective Measures (ACM) Report, or a Proposal for Presumptive Remedy (PPR).

The submission of such material is required within 180 days of the GPS exceedance determination **[9 *VAC 20-80-310.A.1*]**.

The ACM is a detailed investigation into the nature, extent, associated risk, and remedy alternatives for dealing with a documented release from a solid waste management unit.

Completion of the ACM entails two separate but related actions. The VSWMR specify that prior to submitting the ACM report required under ***9 VAC 20-80-310.A.1***, the Permittee shall determine the "nature & extent" of the release. The function of the NES is to provide sufficient data through which an assessment of site-specific corrective measures can be completed **[*9 VAC 20-80-250.D.6.g(1); Appendix 5.6.D.10.b*]**.

These instructions have been developed to assist the Permittee in developing an NES that provides the type of data most likely to support the development of a Corrective Action Plan (CAP). The content of these instructions has been modeled, in part, after several existing references including:

- RCRA Correction Action Plan (Final) **[EPA 520-R-94-004]**,
- Conducting Remedial Investigation/Feasibilty Studies for CERCLA Municipal Landfill Sites **[EPA 540-P-91-001]**,
- Site Characterization for Subsurface Remediation **[EPA 625-4-91-026]**,
- A Comparison of the RCRA Corrective Action and CERCLA Remedial Action Processes **[DOE/EH-0365]**,
- RCRA Corrective Action & CERCLA Remedial Action Reference Guide **[DOE/EH-0001]**,
- "Draft" Handbook of Groundwater Policies for RCRA Corrective Action **[EPA 530-D-00-001]**.

Since many of these references were developed for RCRA Subtitle C and/or NPL facilities, the Department has used them as a means of identifying data types and sampling techniques that have previously proven successful in completing NES-type investigations. It is important to note that other data or reporting requirements contained in the sources listed above, which are not applicable to the activities required under ***9 VAC 20-80-310***, have not been made part of these instructions.

These instructions have been developed as guidance, not a rule. They have not gone through public comment. They may be altered to fit facility-specific conditions where needed. The Department understands the importance of site-specific considerations and technical details in defining the final content of an NES and has developed these

submission instructions as an outline of the *minimum* technical content to be addressed within an NES.

3.0 BENEFITS OF INSTRUCTIONS

The Department believes developing NES submission guidelines will:

- provide the minimum technical content of an NES report,
- decrease internal Department review time, and
- assist the regulated community with preparing technically complete documents.

The intent of standardizing the submissions is to reduce the time between detection of constituents at statistically significant levels above the established GPS, and the final implementation of a site specific Corrective Action Plan.

4.0 REPORT FORMAT

While the technical findings of the NES are used for the completion of the ACM report, the VSWMR **(*9 VAC 20-80-250.D.6.g, Appendix 5.6.D.10.b, or 9 VAC 20-80-310*)** do not require that the two document types (NES & ACM) be combined as a single submission.

Consequently, the NES may be submitted as a stand-alone technical document and the submission instruction headings contained here have been designed for just such an application.

A Permittee who wishes to submit the NES as part of the ACM document can do so. In cases such as this, the NES should be clearly defined within it's own separate section of the combined document (i.e. Section 1, Volume 1, etc.) and the headings may be altered to fit the format of the ACM. However, for the sake of consistency and to ensure an expeditious review, the information (technical content) should be arranged in the order presented within these submission instructions.

At a minimum, the NES report shall address each of the information topics noted in these instructions and except as noted above, should follow the section format outlined in Table I of these instructions.

The sections listed herein shall be considered standard technical content. Please note that NES report submissions that do not provide the standard technical content outlined here may be judged incomplete during technical review.

The Department notes that there may be some site specific instances where a facility's technical data may require additional information beyond that listed in these submission instructions as a means of more fully characterizing the technical data available and conclusions derived from that data. These instructions set no limit on the number or content of additional report sections as long as the information included directly pertains to that required of an NES report. Similarly, there may be some older facilities that may lack data types currently available to newer landfills. In these cases, the NES should state that the information is not readily available.

The administrative and technical content expected for each section of the NES report is briefly described on the following pages.

Cover Page – Provide the following information:

- Landfill Name
- Landfill location
- DEQ Permit #
- DEQ Region
- Name & Address of the Consultant
- Name & Address of the Permittee
- Date report submitted

Signature Page – This page should contain the signature & seal of a qualified groundwater professional certifying the content & findings of the NES report.

Table of Contents – Specify the order and organization of the report sections as outlined in Table 1 of these instructions.

Executive Summary – Provide a brief summary of the following technical findings of the NES:

- Date of initial GPS exceedance
- Locations of impacted site wells
- Description of additional site wells installed
- Discussion of NES groundwater sampling results
- Description of the nature and extent of the release as identified during field activities

Introduction – Discuss how the data gathered during the NES is sufficient to support the completion of the Assessment of Corrective Measures (ACM), or the Proposal for Presumptive Remedy (PPR).

Discuss, in general terms, how the work performed pertaining to the NES serves to:

- Define and evaluate the vertical and horizontal extent of the release of landfill constituents to groundwater,
- Define contaminant migration path(s),
- Characterize the nature (chemical characteristics) of the constituents of concern, and
- Collect data sufficient to characterize the risk posed by the release to human and other environmental receptors

An introductory discussion should be provided indicating how the work performed addresses the purposes outlined above.

The Permittee should indicate the NES report was submitted in a format consistent with these submission instructions and applicable reference(s) in the VSWMR. The report should describe any limitations (company specific language), as well as definitions for any technical or laboratory terminology used in the report. The report shall describe the QA/QC procedures used during the NES study (i.e., refer to the most current version of the facility's Groundwater Monitoring & Sampling and Analysis Plan).

While the Department does not provide review or approval to any site specific health & safety plans, the report should state that the facility had a Health & Safety Plan in effect, (a Federal requirement under **29 CFR 1910.120 and 40 CFR 300.430(b)(6)**), during the NES field activities.

Site Description – Existing data should be used to develop a site description that includes a discussion of location, topography, geology, land use, waste types, and a chronology of significant monitoring actions (initiation of Detection monitoring, initiation of Assessment monitoring, establishment of GPS, initial GSP exceedance, etc.) on site.

The NES should provide the following site-specific information listed in this section. Much of the information may be transferred from prior sources such as Annual Reports, Closure Plans, and Part B applications. These documents may be referenced as needed. However, the information below should still be summarized within the NES and may be presented as either text, in a table-format, or as bulleted items, as long as it is consistent with the organization of the information outlined in Table 1 of these submission instructions. Where historical information is partial, missing, or otherwise unavailable, this fact should be stated in the appropriate section of the NES.

Maps, when submitted as part of the NES, shall contain up-to-date site information, shall be constructed on a "current" topographic base reflecting site conditions, and shall contain both a numeric and graphic (bar) scale.

(1) Site Background Information

- Identify date Permit was issued.
- Identify landfill type (sanitary, industrial, CDD).
- Identify when waste disposal operations began.
- Identify if leachate system or liner is in place.
- Identify site acreage.
- Identify acreage used for waste disposal.
- Identify waste disposal method.
- Identify vertical extent (depth below groundsurface) of the waste mass.

(2) Physical Setting Information

- Identify facility on USGS 7 ½-minute topographic map.
- Include a copy of the topographic map as a Figure.
- Identify site geology (i.e., igneous rock, metamorphic rock, sedimentary rock, saprolite, or unconsolidated sediment) using site specific data, or published geologic source material. If available, include geologic map as a Figure.
- Identify surficial soils using USDA Soil Conservation Service reports, or site specific (borings) data. Discuss porosity, permeability, and depth to bedrock.
- Describe general site topography and surface drainage, review historical maps to determine whether zones of preferential transport such as former drainage swales, sinkholes, or seeps or springs were covered, or re-routed, during the waste disposal actions on site.
- Unless greater than one mile away, identify the nearest permanent surface water body or perennial stream/river.
- Unless greater than one mile away, identify the nearest private drinking water well or state that all adjoining properties are served by public water supplies. In addition, indicate if primarily private wells or a public water supply serves the area.
- Identify adjoining land use types.

(3) Aquifer Recognition

- Identify the nature of the uppermost aquifer (i.e., overburden, saprolite, bedrock).
- Identify the nature of the groundwater table (i.e., confined, semi-confined, unconfined).
- Identify the general areas of aquifer recharge on site.
- Identify any areas of aquifer discharge on site, note whether or not the information is based on site specific data such as nested piezometer data, or by visual examination (i.e., seeps or springs).
- If the aquifer is of a karstic nature, describe the influence of conduit flow (and any structural control on the development of such conduits) on contaminant migration direction.
- Discuss general depth to groundwater on site.
- Discuss Hydraulic Conductivity.
- Discuss Hydraulic Gradient.
- Discuss Groundwater Flow Rate and Direction, include a Potentiometric map as a Figure.

(4) Monitoring Well Network

- Identify all upgradient and downgradient monitoring wells within the Assessment or Phase 2 compliance network.
- Identify each well on a facility site plan drawing. In addition, provide a table listing each well and include information on the elevation of the top of well casing, the depth of the well, the depth to the screen interval and the date of installation. On the site plan and in the table include:
  - Any wells, which have been abandoned and note whether any of these wells had shown historical impact to groundwater.
  - Any wells used solely as piezometers.
  - Any wells installed as part of the NES.

(5) Groundwater Protection Standards

- Identify when facility established GPS.
- Identify when initial GPS exceedance was noted.
- Identify exceeding constituents.

Evaluation of Historical Groundwater Quality – Provide a discussion of prior detected Appendix 5.1 constituents noting any increasing or decreasing trends. List (table format preferred) the Appendix 5.1 constituents detected in groundwater during groundwater monitoring activities. Highlight those constituents that have exceeded GPS.

If applicable, discuss the possible interactions of different aquifer horizons found to be impacted (i.e., impact to a saprolite aquifer, as well as the underlying fractured bedrock aquifer).

Nature (Chemical Properties) of Contaminants of Concern - Discuss the groundwater characteristics (water solubility, density, biodegradability, etc.,) of each of the compounds found above GPS (i.e., LNAPL's, DNAPL's, solubility, etc.). The

discussion of the toxicity of such compounds is not the purpose of the NES and should be reserved for (other sections of) the ACM.

Discuss the possible contribution of landfill gas migration toward any volatile organic compounds found outside the waste mass. Note whether the facility has a gas extraction system in place and whether or not the levels of organic constituents noted in historical groundwater data have changed since installation of the gas control system.

NES Field Actions– Describe all the actions undertaken onsite, including the installation of new wells and methods used, installations of piezometers or other temporary sampling points and methods used; geophysical surveys (the type of), fracture trace studies, sampling of groundwater; sampling of surface water (if applicable); sampling of private wells (if applicable); or any other such actions deemed necessary to obtain data sufficient to define the extent, direction, and rate of movement of the contaminant plume(s).

Well completion diagrams, boring logs, surveyed elevation data, field forms and laboratory data sheets should be included as Appendices to the NES.

NES Groundwater Sampling & Evaluation – Note which wells were sampled during the NES. State that the field sampling procedures followed were those listed in the facility's existing permitted or approved Groundwater Monitoring and Sampling & Analysis plan dated ____, or where no such plan exists, the technical specifications put forth in the most current version of the USEPA's Technical Enforcement Guidance Document, 1986 (TEGD), and Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, as amended, (SW-846) Manuals.

State the name of the laboratory performing the chemical analysis, the type of analytical methods used, laboratory limits of detection (LOD) and quantitation (LOQ) and a notation that the methods used meet or exceed those listed in SW-846 as updated **[*9 VAC 20-80-250.D.4.b; 9 VAC 20-80-260.D.4.b; 9 VAC 20-80-270.D.4.b*]**.

Provide a list (in table format) of those organic and inorganic constituents found at both detectable (j-flagged) and quantifiable levels during NES activities. Highlight those compounds found at levels above their respective GPS. Highlight those compounds, if any, represented by an immiscible phase. If verification sampling was undertaken during the NES, the results must be specified in this section. Full laboratory results should be included as an Appendix to the NES.

Plume Extent (Evaluation/Definition) – Describe the technical data used to define both the vertical and horizontal extent, and rate of migration of all plume(s) of impacted groundwater identified onsite. Describe any aquifer factor (gas migration in the vadose zone, structural control, zone(s) of discharge, presence of an aquitard, etc.) which may influence the vertical or horizontal extent of plume migration. Figures showing the constituent specific boundaries (extent) of all plume(s) on site should be included in the NES.

Risk for Offsite Impact – Discuss (in cases where no offsite wells have been installed or tested) the relative risk or likelihood for offsite impact by groundwater containing compounds at concentrations above their respective GPS. For sites where offsite impact has already been identified, state that the notification requirements of ***9 VAC 20-80-250.D.6.g.(1).c*** have been met.

NES Conclusions – Provide a summary of findings of the NES (these should correspond to the content included in the Executive Summary section).

NES References – Provide a list of all published reference materials cited in the NES report.

Figures – Provide at a minimum copies of the:

- USGS 7 ½-minute topographic map - showing the site location
- Site Plan - to include topographic contours, permanent structures, surface water features, a bar scale, north arrow, facility boundary, waste management unit boundary, and all monitoring wells – labeled with ID #
- Potentiometric map - surface contours and groundwater flow direction with arrows showing flow direction for those sites with an aquifer type other than fractured bedrock.
- Plume boundary map - showing the plume limits for each separate constituent found above its GPS.
- Optional figures - may include copies of published geologic maps, US Department of Agriculture soils maps, geologic cross-sections, and National Wetland Inventory maps (if applicable)

Appendices – Provide at a minimum, copies of the following:

- Groundwater flow rate calculations
- Boring logs for the newly installed NES wells
- Field Sheets
- Chain of Custody records
- Laboratory Analytical Results
- Completed QA/QC Checklist

5.0 SUBMISSION TIMELINES

If, after statistical analysis, it has been determined that one or more Appendix 5.1 constituents are detected at statistically significant levels above the established groundwater protection standard (GPS), the VSWMR require the Permittee to complete an Assessment of Corrective Measures (ACM) Report, or a Proposal for Presumptive Remedy (PPR) within 180 days of such determination **[*9 VAC 20-80-310.A.1*]**.

The VSWMR require that an ACM be initiated within 90 days of determining the GPS exceedance. The NES **[*9 VAC 20-80-250.D.6.g(1); Appendix 5.6.D.10.b*]** is the initial part of the ACM or PPR process. Since the VSWMR allow 180 days from the statistical evaluation to submit the completed ACM or PPR, the NES should be finished as soon as technically feasible. For those facilities which choose to submit the NES as a stand-alone document, the Department suggests that the NES be submitted within 120 days of determining the GPS exceedance following the statistical evaluation. For Permittees who choose to submit the NES as part of a single ACM document, then the submission must meet the time requirements of ***9 VAC 20-80-310.A.1***.

The VSWMR do not require Department review and approval of a proposed NES work plan. Facilities which request Department input (review) of a proposed NES scope of

work should understand that such review will not remove the requirement of the facility to meet the ACM submission timelines established under ***9 VAC 20-80-310.A.1***.

6.0 EXTENSIONS FOR SUBMISSIONS

9 VAC 20-80-310.A.1 allows a Permittee to request an extension to the 180 day ACM / PPR submission timeline, and gives the Director the authority to grant such a request for good cause. The decision to grant extensions will be made case by case, based on the technical information supplied by the Permittee. The most justifiable reason for requesting an extension would be if the initial results of the NES (which has no strict submission deadline) indicate the need to install additional NES wells to fully characterize the release. Such action would delay completion of the NES; and, therefore push back the public participation period, and date of ACM completion. The Permittee should notify the Department as soon as possible if initial results of the NES indicate further site activities will be required.

7.0 DEPARTMENT REVIEW

Neither **40 CFR 258.56 or,** ***9 VAC 20-80-310***, require the Department to issue "approval" to the findings of the NES. However, the Department reviews the NES to ensure that the technical actions undertaken have been sufficient to meet the performance standards of ***9 VAC 20-80-250.D.6.g.(1)*** or ***Appendix 5.6.D.11.b***. For NES reports submitted under separate cover from the ACM, the Department will acknowledge receipt of the submission, and when necessary, issue a Technical Review letter if deficiencies in technical content have been noted.

Where no deficiencies in technical content are noted, the Department will instruct the Permittee to continue with the ACM submission process.

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